

# PSYCHOPHYSIOLOGY

THE JOURNAL OF OBJECTIVE RESEARCH  
IN THE PHYSIOLOGY OF BEHAVIOR

Volume 2

*July 1965-April 1966*

Published for the SOCIETY FOR PSYCHOPHYSIOLOGICAL RESEARCH by  
THE WILLIAMS & WILKINS COMPANY  
Baltimore, Maryland

Copyright © 1966, The Williams & Wilkins Company

## CONTENTS OF VOLUME 2

### No. 1, JULY 1965

Modification in Autonomically Mediated Physiological Responses to Cold Pressor by Word Associations. ROY B. MEFFERD, JR., AND BETTY A. WIELAND.....	1
The Effects of Verbal Responses on the Laboratory Detection of Deception. LAWRENCE A. GUSTAFSON AND MARTIN T. ORNE.....	10
A Comparison of Skin Potential and Skin Resistance Responses as Measures of Emotional Responsivity. KENNETH R. BURSTEIN, WALTER D. FENZ, JAMES BERGERON, AND SEYMOUR EPSTEIN.....	14
Classical Conditioning of Heart Rate and Galvanic Skin Response in the Rat. T. L. HOLDSTOCK AND J. S. SCHWARTZBAUM.....	25
On the Constant-Current Error in Skin Resistance Measurement. R. C. WILCOTT AND L. J. HAMMOND.....	39
On the Scoring of Heart Rate: Reply to Criticisms. CHARLES R. GALBRECHT AND ROSCOE A. DYKMAN.....	42
A Generator of Very Low Frequency Pulses or Long Time Intervals. P. R. THORNE AND C. C. BROWN.....	47
Electrodermal Responsiveness as Related to Psychiatric Diagnosis and Prognosis. J. A. STERN, W. SURPHLIS, AND E. KOFF.....	51
A Comparative Study of the Skin Potential, Skin Resistance and Sweating of the Cat's Foot Pad. R. C. WILCOTT.....	62
Editorial. CLINTON C. BROWN.....	72

### Instrumentation

A Cardio Preamplifier for the Free-roving Rat. WILLIAM J. MUNDL.....	75
A Respiration Transducer for the Rat. WILLIAM J. MUNDL.....	79

### Communication

On the Effects of Artificial Variation of the Basal Level of Skin Potential. WALTER W. SURWILLO.....	83
--	----

### No. 2, OCTOBER 1965

A Simplified Method of Heart Rate Measurement. EDWARD OPTON, JR., NEIL O. RANKIN, AND RICHARD S. LAZARUS.....	87
Influence of Blood Pressure on Patterns of Voluntary Behavior. RALPH P. FORSYTH.....	98
Stimulus Change and Habituation of the Orienting Response. GEORGE H. ZIMNY AND LEONARD W. SCHWABE.....	103
The B/GSR Module: A Combined Recording to Present Base Skin Resistance and Galvanic Skin Reflex Activity Patterns. DAVID G. SIMONS AND ROBERT E. PEREZ.....	116

Neural Timing Mechanisms, Conditioning, and the CS-UCS Interval. JAMES W. PRESCOTT.....	125
Attempts to Induce the Rapid Eye Movement Stage of Sleep in <i>Macaca mulatta</i> by Brain Stem Stimulation. DANIEL F. KRIKKE, ELLIOTT D. WEITZMAN, AND CHARLES POLLAK.....	132
An Automatic Analyzer of States of Vigilance. RALPH J. BERGER AND GILBERT W. MEIER.....	141
Electroencephalographic Pattern Quantification and the Arousal Continuum. ROBERT S. DANIEL.....	146
EEG Electrodes for In-Flight Monitoring. ERIC R. SKOV AND DAVID G. SIMONS.....	161

#### *Instrumentation*

An Inexpensive Transducer for Remote Determination of Arterial Blood Pressure. JOSEPH HORWITZ AND JAMES AVERILL.....	168
An Inexpensive Masking Noise Generator: Monaural or Stereo. CHARLES T. TART.....	170

No. 3, JANUARY 1966

Studies of Autonomic Balance: A Summary. M. A. WENGER.....	173
The Interaction of Responses in the Brain to Semantic Stimuli. JEROME COHEN AND W. GREY WALTER.....	187
Specificity of EEG Photic Flicker Responses to Color as Related to Visual Imagery Ability. BARBARA B. BROWN.....	197
Instrumental Behavior during Sleep. HAROLD L. WILLIAMS, HENRY C. MORLOCK, JR., AND JEAN V. MORLOCK.....	208
A Re-examination of the Effects of Response-Contingent Aversive Tones on Gastrointestinal Activity. ROBERT M. STERN.....	217
Effects of Some Drugs on Electroencephalographic Fast Activity and Dream Time. B. K. LESTER AND R. GUERRERO-FIGUEROA.....	224
Survey of Practice in Electrodermal Measurement. BERNARD TURSKY AND DONALD N. O'CONNELL.....	237
The "Respiratory Vasomotor Reflex" in the Forehead and Finger. FRED L. ROYER.....	241
Adaptive Value of Arousal Sweating and the Epidermal Mechanism Related to Skin Potential and Skin Resistance. R. C. WILCOTT.....	249
The First Night Effect: An EEG Study of Sleep. H. W. AGNEW, JR., WILSE B. WEBB, AND ROBERT L. WILLIAMS.....	263

#### *Instrumentation*

An Instrument for Producing Irregular but Controlled Timed Periods. P. R. THORNE AND J. H. ANDREWS.....	267
<i>Abstracts of the Literature</i> .....	271
<i>Erratum</i> .....	276

## CONTENTS OF VOLUME 2

v

## No. 4, APRIL 1966

Program: Fifth Annual Meeting of the Society for Psychophysiological Research.....	277
EEG Amplitude Changes during Different Cognitive Processes Involving Similar Stimuli and Responses. PETER F. MACNEILAGE.....	280
The Effects of Threat of Shock on Heart Rate for Subjects Who Differ in Manifest Anxiety and Fear of Shock. W. F. HODGES AND C. D. SPEILBERGER.....	287
Individual Thermal and Behavioral Factors in Cold-Induced Vasodilation. WARREN H. TEICHNER.....	295
The Effects of Verbalization Instructions and Visual Attention on Heart Rate and Skin Conductance. JOSEPH J. CAMPOS AND HAROLD J. JOHNSON.....	305
Thirty-Day Stability of Spontaneous Galvanic Skin Responses in Man. RICHARD F. DOCTER AND LOUIS F. FRIEDMAN.....	311
A Technique for Predicting the Effect of Treatment. CHARLES E. HALL.....	316
Significance and Reliability of Shock-Induced Changes in Basal Skin Conductance. B. E. JONES AND J. J. B. AYRES.....	322
Autonomic and Clinical Correlates of Differential Electroencephalogram Response to Cold Pressor Stimulation. M. B. STERMAN, T. L. CLEMENS, AND M. A. WENGER.....	327
Effects of Concurrent Motor Activity on the Unconditioned Salivary Reflex. BEN W. FEATHER AND DAVID T. WELLS.....	338
Changes in Electroencephalogram and Other Physiological Measures during Serial Mental Performance. PETER F. MACNEILAGE.....	344
The Effects of Selective Deprivation of States of Sleep in the Developing Monkey. RALPH J. BERGER AND GILBERT W. MEIER.....	354
Alpha Amplitude and Arousal: A Reply to Surwillo. R. G. STENNETT.....	372
A Reply to Surwillo on Artificial Skin Potential Basal Level Variation and Skin Potential Response Wave Form. R. C. WILCOTT.....	377
<i>Book Review</i> .....	379
<i>Instrumentation</i>	
A Restraint Device for Cats in an Ultrahigh Frequency Electromagnetic Energy Field. ALLAN H. FREY AND SARAH JANE THORNTON.....	381
A Random Stimulus Generator. THOMAS L. ETTER.....	384
Announcement of Annual Meeting.....	387
<i>Index</i> .....	388

## INDEX FOR VOLUME 2

Acetylcholine  
effect on skin potential and resistance, 249  
sweating response in cats, 62

Alpha amplitude  
arousal, 344  
intertask differences, 280  
palmar conductance, 372  
serial task performance, 344

Alpha blocking, visual imagery, 197

Alpha-chloralose, effect on EEG, 224

Anxiety, threat of shock, 287

Arousal  
alpha amplitude, 372  
autonomic and psychological measures, 87  
EEG pattern quantification, 146  
methodology, 372

Arousal sweating, adaptive value, 249

Arrhythmia, cardiac, respiratory vasomotor reflex, 241

Arterial occlusion, dissociation in cat, 62

Atropine, effect on palmar sweating, 249

Auditory cortex, ablation of and effect on discrimination, 272

Auditory stimuli  
aversive, and gastrointestinal activity, 217  
instrumental behavior during sleep, 208

Autonomic activity, measured in depressive patients, 273

Autonomic afferents, influence on voluntary behavior, 98

Autonomic nervous system (ANS)  
balance and patterns, 173  
psychological disorders, 173  
psychosomatic disorders, 173

Base skin resistance galvanic skin reflex (B/GSR)  
activity patterns, 116  
module for recording, 116

Behavior, voluntary, influenced by blood pressure, 98

Beta amplitude, intertask differences, 280

Biomedical instrumentation, EEG, 161

Blood pressure  
influence on voluntary behavior, 98  
monitored by inexpensive transducer, 168

Brain response, averaging, 187

Brain stem lesions, effect on cats, 273

Brain stem stimulation, and REMP, 132

Breathing rate, during tone stimulation and word association, 53

Cardiopreamplifier, for free-roving rat, 75

Cardiotachograph, for free-roving rat, 75

Cardiovascular system, influence on behavior, 98

Cat, epidermal responses, 62

Central nervous system (CNS), modified by cardiovascular system, 98

Chlorpromazine  
effect on EEG, 224  
response of mental patients, 316

Cold pressor stimulation, autonomic and clinical correlates, 327

Cold pressor test, and word association test, 1

Color, and EEG responses, 197

Conditioning  
classical of autonomic processes, 103  
of GSR, 125  
of heart rate and GSR, 25  
review of symposium on, 379

salivary, and motor activity, 338

Conditioning apparatus, description of, 267

Constant-current circuit, and skin resistance measurement, 39

Constant-voltage circuit, and skin resistance measurement, 39

Cortical-subcortical mechanisms, and GSR conditioning, 125

Covariant analysis, treatment evaluation, 316

CS-UCS interval, in classical conditioning of GSR, 125

Deception, laboratory detection of, 10

Depression  
GSR, 272  
psychotropic drugs, 316

Depressive patients, measurement of autonomic activity, 272

Detection task, thermal mechanisms, 295

Directional fractionation, and verbalization, 305

Discrimination function, psychotropic drugs, 316

Dreams, deprivation, and effect on monkeys, 354

Drugs, effect on EEG activity, 224

Electric shock, skin potential activity, 249

Electrocardiogram (EKG)  
sleep deprivation in monkeys, 354  
tone stimulation and word association, 52  
word association and cold pressor tests, 1

Electrodermal responsiveness (EDR), measured by orienting response, 51

Electrodermogram, during sleep, 274

Electroencephalogram (EEG)  
affected by drugs, 224  
arousal continuum, 146  
brain stem stimulation, 132  
cold pressor stimulation, 327  
electrodermogram changes, 274  
first night effect, 263  
in-flight recording, 161  
instrumental behavior during sleep, 208  
heart rate adaptation, 42  
mental activities, 280  
method for auto- and cross-relation analysis, 273  
psychotropic drugs, 316  
response to color, 197  
semantic stimuli, 187  
serial mental performance, 344  
sleep deprivation in monkeys, 354

Electrogastrogram, aversive tones, 217

Electromyogram (EMG)  
classical and pseudo-conditioning, 25  
sleep deprivation in monkeys, 354  
unconditioned salivary reflex, 338  
vigilance states, 141

Electrooculogram (EOG)  
sleep deprivation in monkeys, 354  
states of vigilance, 141

Evoked responses, cerebral, and semantic stimuli, 187

Fast activity (beta), and drug effect, 224

Finger temperature, during word association and cold pressor tests, 1

First night effect, and EEG, 263

Galvanic skin response (GSR)  
classical and pseudo-conditioning, 25  
depression, 271  
detection of deception, 10  
habituation during serial testing, 271  
measure of orienting response habituation, 103

motivational instructions, 275  
recording method for, 116  
stability in man, 311  
survey of practices, 237  
technique for measurement, 275  
word association and cold pressor tests, 1

Gastrointestinal motility, auditory stimuli, 217

Gastrointestinal potentials, and aversive tones, 217

Habituation, orienting response, 51

Heart rate (HR)  
adaptation, 42  
classical and pseudo-conditioning, 25  
cold pressor stimulation, 327  
measurement methods, 87  
serial task performance, 344  
threat of shock, 287  
tone stimulation, 53  
visual attention, 305  
word association tests, 1, 53

Imipramine, response of mental patients, 316

Instrumental behavior, during sleep, 208

Internal inhibition of delay (IID), GSR studies, 125

Korotkov sound energy, inexpensive transducers, 168

Limbic system, affected by drugs, 224

*Macaca mulatta*  
brain stem stimulation, 132  
sleep studies, 141

Masking noise, inexpensive generator, 170

Mean cyclic maxima, method for smoothing heart rate curves, 87

Mecholyl, effect on skin resistance, 249

MMPI, and GSR, 272

Motivation, GSR in memory, 275

Motor activity, unconditioned salivary reflex, 338

Motor set, effect on EEG, 280

Moving averages, method for smoothing heart rate curves, 87

Muscle tension, serial mental performance, 344

Neural timing mechanisms, precision during GSR conditioning, 125

Orienting response (OR)  
habituation and stimulus change, 103  
respiratory vasomotor reflex, 241

tone stimulus, 51  
 word association test, 51  
 Overlearning, EEG correlates, 274

Pain, word association test, 1  
 Pain threshold, skin resistance, 249  
 Palmar conductance  
     alpha amplitude, 372  
     serial task performance, 344  
 Peak rate method, heart rate measurement, 87  
 Pentothal, effect on EEG, 224  
 Performance, EEG, 344  
 Phenobarbital, effect on EEG, 224  
 Photic flicker response, color, 197  
 Plethysmography, respiratory vasomotor reflex, 241  
 Procain, dissociation in cats, 62  
 Procyclidine, response of mental patients, 316  
 Pseudo-conditioning, heart rate and GSR, 25  
 Psychiatric diagnosis, electrodermal responsiveness, 51  
 Psychological disorders, ANS, 173  
 Psychological variables, effect on physiological responses, 10  
 Psychosomatic disorders, ANS, 173  
 Psychotropic drugs, EEG, 316  
 Pulse generator, description of, 47

Random stimulus generator, design, 384  
 Random time generator, description, 267  
 Rapid eye movement (REMP)  
     brain stem stimulation, 132  
     drug effects, 224  
     first night effect, 263  
 Reaction time, word association and cold pressor tests, 1  
 Reinforcement, instrumental behavior during sleep, 208  
 Respiration rate (RR)  
     cold pressor stimulation, 327  
     serial mental performance, 344  
     word association and cold pressor tests, 2

Respiratory vasomotor reflex, forehead and finger, 241  
 Response-contingent stimulation, gastrointestinal motility, 217  
 Response gradient, skin potential, 23  
 Response specificity, GSR conditioning, 125  
 Restraint apparatus, for cat, 381

Salivary reflex, unconditioned, and motor activity, 338

Schizophrenia  
     electrodermal responsiveness, 51  
     psychotropic drugs, 316  
 Semantic stimuli, brain responses, 187  
 Serial task, EEG, 344  
 Shock  
     basal skin conductance, 322  
     HR and GSR conditioning, 25  
     threat of, and HR, 287  
 Skin conductance (SC)  
     basal, and shock, 322  
     measure of stress response, 87  
     visual attention, 305  
 Skin potential (SP)  
     arousal sweating, 249  
     basal, artificial variation of, 83, 377  
     response wave form, 377  
     cat's foot pad, 62  
     emotional arousal, 14  
 Skin resistance (SR)  
     arousal sweating, 249  
     basal artificial variation, 83  
     recording method, 116  
     word association and cold pressor tests, 1  
     cat's foot pad, 62  
     cold pressor stimulation, 327  
     constant-current circuit, 39  
     emotional arousal, 14  
     measurement, 275  
 Skin temperature, word association and cold pressor tests, 1

Sleep  
     automatic analyzer, 141  
     electrodermogram, 274  
     instrumental behavior, 208  
 Sleep deprivation  
     effect on monkey  
     paradoxical phase of sleep in cats, 274  
 Slow wave sleep, effect of drugs, 224  
 Sodium Amytal, autonomic activity in depressive patients, 272  
 Sokolov, theories of habituation, 103  
 Stereotypy, GSR conditioning, 125  
 Stress  
     in-flight, and EEG monitoring, 161  
     measured by heart rate and skin conductances, 87  
 Sweating, in cat's foot pad, 62  
 Sympathetic nervous system, influenced by word association and cold pressor tests, 1

Temporal processes, classical conditioning, 125

Thermal mechanisms, cold-induced vaso-dilatation, 295  
Timers, electromechanical, 47  
Tone stimulation, orienting response, 51  
Transducer, respiration, in rats, 79

Vasodilatation, cold-induced, 295  
Verbalization, effect on HR and SC, 305  
Verbal learning, EEG correlates, 274  
Verbal response, detection of deception, 12  
Verbal stimuli, psychologically disturbing forms and responsivity, 14

Vigilance, method for analyzing, 141  
Visual attention, effect on HR and SC, 305  
Visual imagery, EEG responses, 197

Wave forms, skin potential, 14  
White noise, inexpensive generator, 170  
Word association test  
  cold pressor test, 1  
  detection of deception, 10  
  orienting response, 51  
  skin resistance and potential, 14